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Farmers' Bulletin 1117

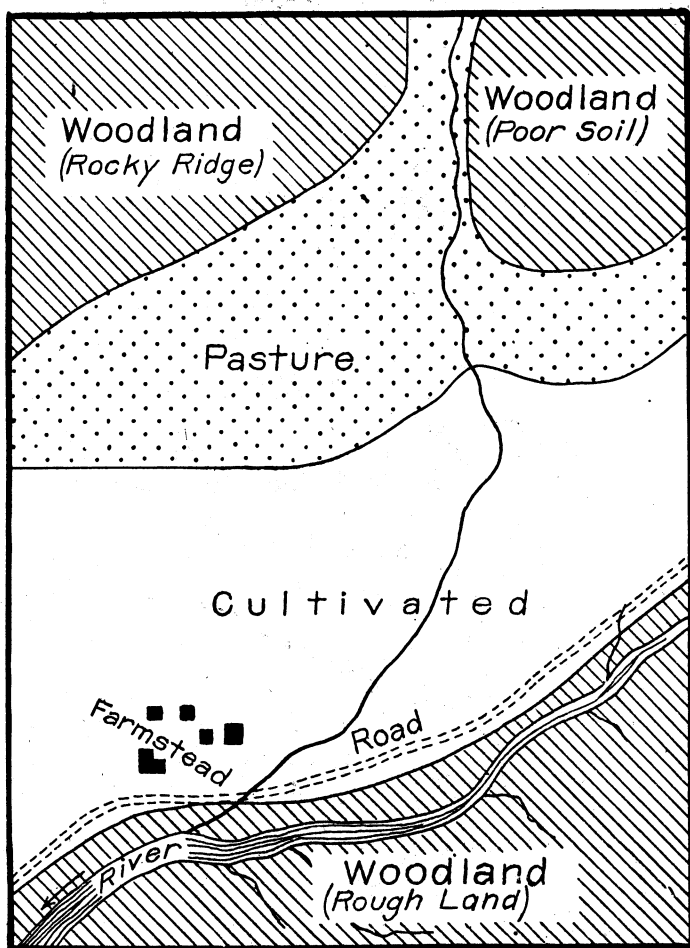
United States Department of Agriculture

Rev.ed.
follows

FORESTRY AND FARM INCOME



NO IDLE LAND ON THE FARM.



Woodland on the hills, pasture land on the slopes, and cultivated land below.

Contribution from the Forest Service
WILLIAM B. GREELEY, Forester
Washington, D. C. August, 1920

FORESTRY AND FARM INCOME.

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WHY FARM FORESTRY PAYS.

THE right handling of forest trees on the farm will make it more prosperous, add to its comforts as a home, and enhance its value as an investment.

The home forest, in many sections of the country, will supply the timber which the farm needs for buildings, fences, fuel, repairs of all kinds, and many other uses; and there will often be a surplus which can be sold in the form of standing timber, saw logs, posts, poles, crossties, pulpwood, fuelwood, and blocks or billets for making spokes, handles, spools, boxes, barrels, and excelsior.

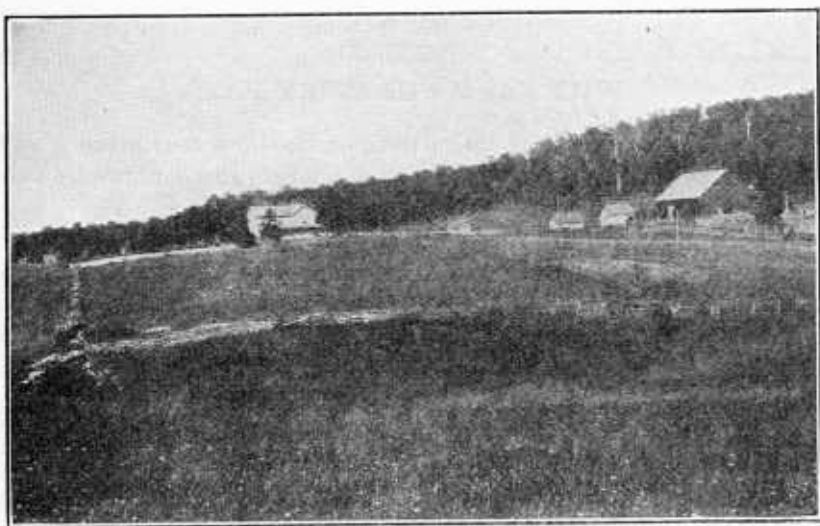
A well-cared-for home forest serves also as a windbreak for buildings, a shelter for live stock, a protection of valuable lands from erosion, a means of profitable employment for men and teams during otherwise spare or idle time, a place of recreation, and an improvement in the appearance of the farm.

Trees improve and build up the soil. The leaves, small twigs, and other tree litter decompose and form a layer of dark-colored vegetable mold, which enriches the soil and stores up soil moisture. By means of this layer of mold, the binding of the soil by the roots of the trees, and the resistance of the trunks to the rapid flow of water, the woods prevent floods from gulying or destroying the land by erosion, particularly on steep slopes.

Even if a farmer sells no timber the woodland pays. The firewood, fence posts, and material for repair and construction on the farm, the time and money saved by having them conveniently on hand, and the protection against extremes of weather afforded the crops, farm buildings, and stock are worth considerably more than the slight trouble and expense of raising and caring for the trees.

The woods need not occupy good farm land that will grow other crops. Trees should, as a rule, be located on land too poor to cultivate, such as gullied or very rocky land, swamps, steep slopes, and barren soils. Unused corners and small uncultivated spots about the farm are good places for rapid-growing, useful trees. The chief economic reason for timber growing on the farm is to get a profit from those portions which would otherwise be unproductive.

Though the land on which the farm forest is situated may not be suitable for other crops, it should not be treated as waste land. (Fig. 1.) By a little care it can be made to produce valuable timber. Only a little attention is required, and this may be given in the winter or when other farm work is slack. Forest trees and woodland are



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FIG. 1.—Timber for the farm and for market, and shelter for the farmstead from woodland covering a stony ridge.

more valuable now than they were a few years ago. Many trees that used to have little value, and even small trees that used to be counted as brush to be got rid of, are now in good demand.

A permanent woodland is an essential part of a well-equipped farm; and more than ever before farm woodland has become a valuable asset convertible into money.

EXTENT OF FARM WOODLANDS.

About one-third of all the forest land of the United States is on farms. According to the latest available figures (1910 census) this means that the farm woodlands amounted in all to about 190,000,000 acres. In the eastern United States—east of the Plains—the total woodlands on farms amounted to about 178,000,000 acres. (Fig. 2.)

This is equivalent, roughly, to the aggregate area of the States of Pennsylvania, West Virginia, Ohio, Indiana, Illinois, Kentucky, and Tennessee. If placed contiguous it would form a solid strip 105 miles in width reaching from New York to San Francisco. Farm woodlands in the eastern United States comprise an area nearly eight times as large as the entire forest lands of France, which furnished

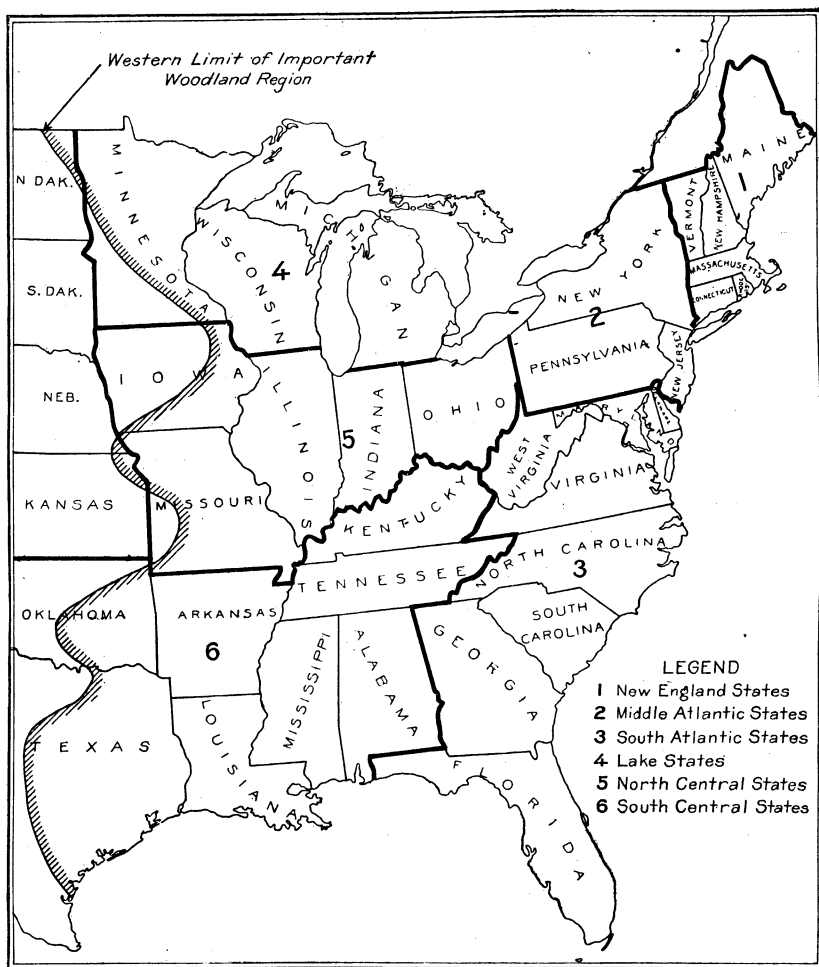


FIG. 2.—Important farm woodland regions.

practically all the timber required during the war by the armies of France, Great Britain, Belgium, and the United States.

Assuming that every farm in the eastern United States has some woodland, there is an average of about 32 acres per farm. The amount of woodland on farms varies somewhat, however, in the different sections of the country. That portion of the United States

under consideration is shown with its subdivisions in figure 2. The average area of woodland per farm and the average proportion of the farm that is wooded in the eastern half of the United States¹ are shown in the following table:

Group of States.	Average area of woodland per farm.	Proportion of farm land wooded.	Total area of farm woodland.
	<i>Acres.</i>	<i>Per cent.</i>	<i>Acres.</i>
New England (6).....	41.6	39.8	7,852,913
Middle Atlantic (3).....	19.8	21.6	9,255,580
South Atlantic (8).....	43.8	46.9	21,037,133
Lake (3).....	22.6	18.1	12,227,525
North Central (5).....	17.0	14.4	47,902,665
South Central (8).....	38.4	30.5	76,343,075
Average per farm.....	31.6	27.7	174,618,891

VALUE OF WOODLAND PRODUCTS.

Considerable income may be derived from the home forest. The total value of forest products taken from timbered land on farms east of the Great Plains, reported in the 1910 census, was \$195,-306,000.² More than half of this represents the value of wood and various minor wood products used on the farm and the rest the

TIMBER RAISING IN EASTERN UNITED STATES PAYS BECAUSE—

1. There is plenty of cheap land unfit for agriculture.
2. The abundant rainfall permits rapid tree growth.
3. Transportation facilities by rail and water are good.
4. Numerous large cities furnish an adequate market.
5. The region is far removed from the virgin supplies of the Pacific Northwest.

¹ Includes 33 eastern States, as far west as and including the tier of States from Minnesota south to Louisiana, and Oklahoma and Texas.

² On account of big increases in value and probably some increase in production, the total value of the material cut from farm woodlands in 1919 is estimated at about double, or about \$400,000,000.

value of the products sold or cut and held for sale. For the farms reporting this amounts to an average of about \$85 per farm. Thirty-five States reported over \$1,000,000 each in forest products from their farms; and three—North Carolina, New York, and Virginia—reported more than \$10,000,000 each.¹

Firewood is one of the important crops of the farm. In 1918 an average of 11.5 cords of wood, or a total of 77,092,000 cords, were burned on the farms of the country. The total production of cordwood during the year, which includes wood burned on farms and that sold by farmers to city dwellers, amounted to approximately 102,903,000 cords. The average farm value in 1918 was \$4.73 a cord. The figures show that farmers in the southern States are the heaviest fuel-wood users. North Carolina leads with an average of 18 cords used on each farm during the year. The farms of South Carolina and Arkansas averaged 17 cords; of Mississippi, 16 cords; of Georgia, Tennessee, Louisiana, Kentucky, Nevada, and Vermont, 15 cords. The value of the fuel-wood crop cut from farms in 1918 was exceeded by that of only five crops—corns, wheat, oats, rye, and cotton.

SECURING GOOD FOREST GROWTH.

At present farm woodlands are yielding, as a rule, only from one-third to one-half the wood they could grow. This is because only a few farmers realize the possibilities in their woodlands and give them proper care. As a result the home forest, which is close at

\$1 A DAY PROFIT.

A NEW YORK FARMER'S WOODLAND OF 115 ACRES EARNS HIM A CONTINU- OUS PROFIT OF \$1 A DAY.

The annual growth is 0.65 cord per acre.

$115 \times 0.65 = 75$ cords (mostly poplar).

He cuts an annual crop of 75 cords.

His profit is \$4.86 per cord.

$75 \times \$4.86 = \$364.50.$

¹ More than three-quarters of the present total timber supply of the United States is on privately owned lands. Much has been said about the National Forests, but the fact is that they contain somewhat less than one-quarter of the country's timber, and the timber now being cut from them represents only about 3 per cent of the entire consumption. The rest comes from private lands.

hand, where a little attention each year in protecting, cutting, and utilizing the timber would be very profitable, is in poor condition.

The amount of timber that an acre can grow in a year varies a good deal with the quality of the soil and moisture supply and the kind and number of the trees per acre. If fully stocked with trees and well cared for, an acre of hardwoods should grow yearly from about one-half to 1 cord of wood and of pine from 1 to 2 cords, a cord being equivalent to about 500 board feet of saw timber. Growth averages rather less in the northern part of the country because of the shorter season and somewhat more in the warmer southern part.

The chief essentials in keeping the trees growing are excluding fires and allowing the humus to collect on the forest floor. Large openings in the woods reduce the annual yield of timber and should not be allowed to occur. The length of time required to reach merchantable size varies with the kind of tree and the use to which its wood is to be put. Posts and crossties may be grown in from 10 to 30 years, and most kinds of quick-growing trees will be large enough for saw timber in from 20 to 40 years.

After logging, a new stand of young trees generally starts naturally from seeds or sprouts from stumps. The natural seeding process in the woods can be helped by harrowing the ground or, before the seed falls, turning hogs into the woodland, both of which enable the seed to get in contact with the mineral soil, or by conducting logging operations in a good seed year before the seed falls, so that it germinates quickly.

A WHITE PINE STAND IN NEW HAMPSHIRE GROWS 1,000 BOARD FEET A YEAR.

Two acres of white pine, near Keene, N. H., were sold three or four years ago, before the war prices, for \$2,000 on the stump. The total stand was 254 cords, which equals 170,000 board feet, or an average of 85,000 feet per acre. The trees were from 80 to 85 years old; so the growth on each acre was about 1,000 feet per annum and the gross returns about \$12.20 per acre per annum.

Some points to be remembered about trees which sprout are: (1) The most thrifty sprouts come from clean, well-cut stumps felled during the late fall, winter, or very early spring before the sap begins to flow; and (2) the top of the stump should be cut slanting, so as to shed water. Trees which sprout successfully include such



FIG. 3.—Thrifty woods, good crops, and a happy farmer.

hardwoods as the oaks, hickories, chestnut, basswood, gums, cottonwood, and willows, and young short-leaf and pitch pines.

Woodlands may also be restocked with young trees by sowing seed or planting out small seedlings grown in nursery beds or dug up in the woods. If trees are to be planted, it is well to select those native to the region which grow most rapidly and produce the most useful kinds of wood.

TREES TO CUT FOR IMPROVING THE WOODS.

Trees which are well suited for firewood, and the removal of which will be an improvement to the remaining trees in the stand.

Trees which have been overtopped by others and have had their growth stunted.

Diseased trees, or trees seriously injured by insect attacks, or trees extremely liable to such injury; for example, chestnut in the region subject to blight or birch in the gipsy-moth area.

Badly fire-scarred trees.

Trees of the less valuable species, such as beech, birch, black oak, black jack oak, or black gum, crowding the more valuable sugar maple, white or shortleaf pines, yellow poplar, or white oak.

Crooked trees and large-crowned, short-boled trees which will not make good lumber and which are crowding or overtopping others.

Slow-growing trees crowding fast-growing species of equal value.

Sound dead trees, both standing and down.

- IMPROVING THE WOODS BY CUTTING.

Cutting should be done so as to cause the least possible waste or damage to other living trees, particularly young trees. In felling trees, advantage should be taken of natural openings in the woods.

Good management should result in a home forest fully stocked with sound, well-shaped trees of valuable and useful kinds that are growing as fast as possible. This can be brought about largely by cutting out the inferior kinds—the “weed” trees—for exactly the same reason that weeds are hoed out of the cornfield. The good trees need the light, space, soil moisture, and plant food that would



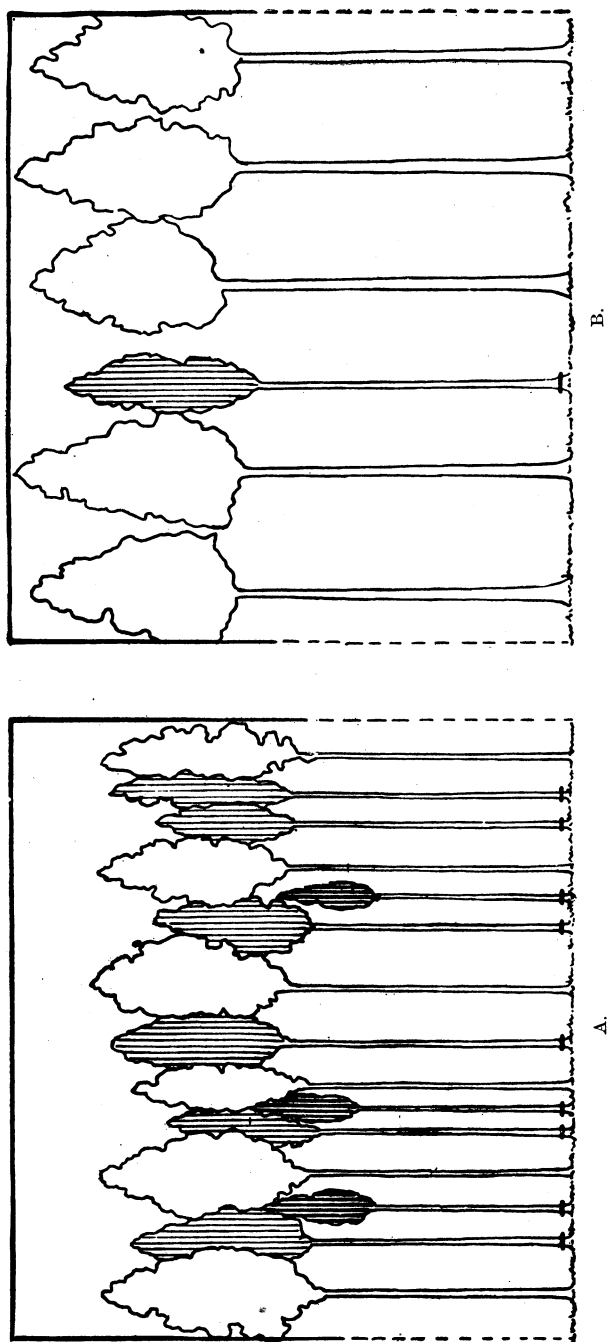
FIG. 4.—Woods improved by right cutting.

otherwise be taken by the less valuable trees. Sometimes it becomes advisable to fill openings or improve the quality of the woods by planting seeds or seedlings of desirable kinds of trees.

What sort of trees should be removed? Dead and dying trees; diseased trees; deformed trees which shade out better ones; the less valuable kinds, such as gray birch, aspen, blackjack oak, dogwood, sourwood, blue beech, ironwood, and others; and the less promising trees in crowded groups. By following this practice each year improvement in the forest is brought about in a relatively short time.

The wood removed in improvement cuttings need not be a loss. It should be considered as an early crop that can be used or sold, generally at a price to show a profit on the work of thinning, while the woods are made more valuable by its removal.¹

¹ See Farmers' Bulletin 711, "The Care and Improvement of Farm Woods."



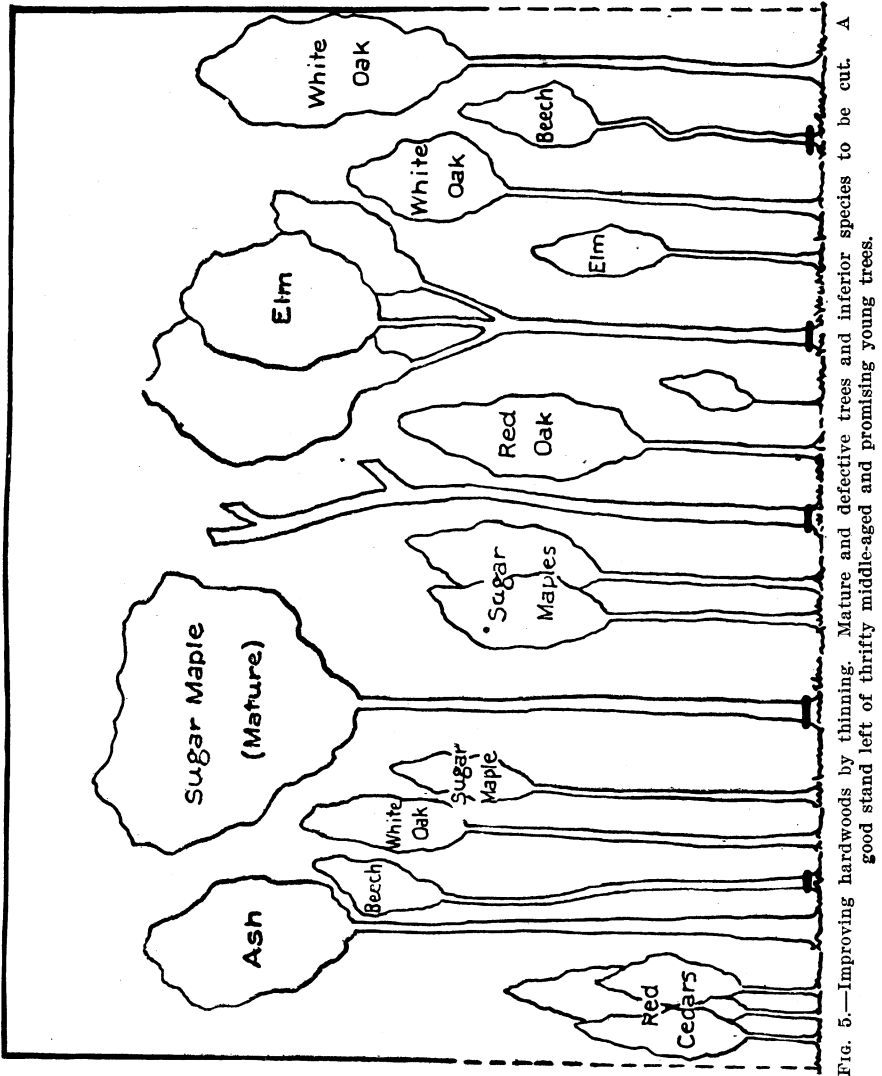
B.

A.

FIG. 6.—The growth and value of pine are increased by repeated thinning. The trees removed can generally be used or sold profitably for firewood, treated fence posts, or small timber. (A) Before thinning—15 overcrowded trees. (Shaded trees to be cut.) (B) The same stand 5 years later after thinning—6 larger and more valuable trees. (Shaded tree to be cut).

ESTIMATING AND SELLING TIMBER.

When timber is no longer growing at a profitable rate it should be cut and used or sold. A farmer who is ready to sell timber would profit by measuring his trees, estimating how much saw timber or



other products they contain, and making inquiry to find out how much they are worth. If he does not know or can not find out how to do this, he should employ some experienced and reliable person to estimate and value his timber for him.

The customary units of measure in selling farm timber are board feet, cords, linear feet, and the piece. A board foot, for example, is 12 inches long, 12 inches wide, and 1 inch thick, or its equivalent.

TEN HELPS IN MARKETING WOODLAND PRODUCTS.

1. Get prices for various wood products from as many saw mills and other wood-using plants as possible.

2. Before selling, consult neighbors who have sold timber and benefit from their experiences.

3. Investigate local timber requirements and prices. Your products may be worth more locally because transportation is saved.

4. Advertise in papers and otherwise secure outside competition.

5. Secure bids if practicable both by the lump and by log-scale measure.

6. Be sure that you are selling to responsible purchasers.

7. Get a reliable estimate of the amount and value of the material before selling.

8. Market the higher grades of timber and use the cheaper for farm purposes.

9. Remember that standing timber can wait over a period of low prices without rapid deterioration.

10. Use a written agreement in selling timber, especially if cutting is done by purchaser.

The standard cord of wood is 4 feet high, 4 feet wide, and 8 feet long. The linear foot is a measure of length only, without regard to the other dimensions of the material. Piece measure is only a count of the pieces in any form in which the wood is sold.



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FIG. 7.—Fast-growing hickory is one of the most marketable forest trees. It is in strong demand for spokes and implement handles.

Logs and standing trees are usually estimated in board feet. Saw timber is measured in board feet. Round timber, such as poles and piling, is usually sold by the linear foot. Firewood, pulpwood, and wood for distillation and other uses cut in short lengths are usually sold by the cord. Fence posts, ties, telephone poles, and some other forms of timber are sold by the piece.

FARM WOODLAND IN THE NORTH.

Farm woodlands amount to two-fifths of all forested lands.

There are about 53,000,000 acres of farm woodland.

In New England more than 65 per cent of all forested land is on farms, and in Ohio, Indiana, Illinois, and Iowa from 80 to 100 per cent.

The income to farms from timber products is estimated at about \$162,000,000 yearly.

Saw timber in the standing tree is estimated by measuring the diameter of the tree, outside the bark, at breast height ($4\frac{1}{2}$ feet above the ground), and measuring or estimating the height of the tree. When these measurements are known the contents of the tree can be found from a volume table.¹ Often the length of the part of the trunk to be used is taken in units, or number of 16-foot logs, instead of the total height of the tree.

A volume table is one showing in board feet the amount of timber that can be sawed from trees of given heights and diameters or from a given number of merchantable logs and diameters. For example, a volume table for white oak would show that a tree 18 inches in diameter (measured outside the bark at breast height) and having three merchantable 16-foot logs will saw out 286 board feet of lumber. Volume tables are made for different kinds of trees, each table based on the average of many measures of felled trees.

A saw log is measured by taking the length of the log and its diameter inside the bark at the small end, then employing a log rule to estimate the amount or number of board feet it contains. A log rule is a statement of the estimated number of board feet of lumber that can be sawed from logs of different lengths and sizes. A good rule for 12-foot logs is to multiply the diameter inside bark at the small end by half the diameter. For shorter logs the contents will be proportional to the length of the logs. Thus, a 12-foot log 16 inches in diameter will saw out about 16×8 or 128 board feet, while a 10-foot log 14 inches in diameter will cut $\frac{1}{2}$ of 14×7 , or $81\frac{1}{2}$

¹ For volume tables and other information on estimating and measuring timber, see *Farmers' Bulletin 715* or apply to State foresters.

FARM WOODLAND IN THE SOUTH.

Woodlands on farms comprise one-half of all the forested lands.

There are more than 125,000,000 acres of farm woodland.

In Maryland, Virginia, North Carolina, Kentucky, and Oklahoma, more than 60 per cent of all forest land is on farms.

The present yearly farm income from woodlands is estimated at about \$150,000,000.

board feet. The Doyle rule is probably most commonly used in this country. To determine the number of board feet in a log by this rule deduct 4 inches from the diameter of the small end, then square one-fourth the remainder and multiply the product by the length in feet. For example, a log measuring 20 inches at the small end and 12 feet long contains 192 feet. This is not an accurate rule for small-sized timber, since it shows one-half to one-fourth fewer board feet in logs from 6 to 20 inches in diameter than are actually sawed out in the mill. For logs larger than 20 inches it is fairly accurate. In buying and selling operations the value placed on small logs is sometimes made to take into account the small scale on the basis of the Doyle rule, but more often the seller is the loser.

FARM FORESTRY MAKES FARMING PAY BETTER BY—

1. Marketing timber profitably.
2. Supplying timber for farm needs.
3. Furnishing employment for men and teams in winter.
4. Making waste lands yield a profit.
5. Increasing the sale value of the farm.

For handy reference the Champlain and Doyle log scales are given (Tables 1 and 2) for logs measuring from 6 to 25 inches in diameter. The former scale shows approximately the amount of lumber that can be sawed out in small mills using circular saws, cutting $\frac{1}{4}$ -inch saw kerf but operated carefully without unnecessary waste and otherwise closely utilizing the timber.

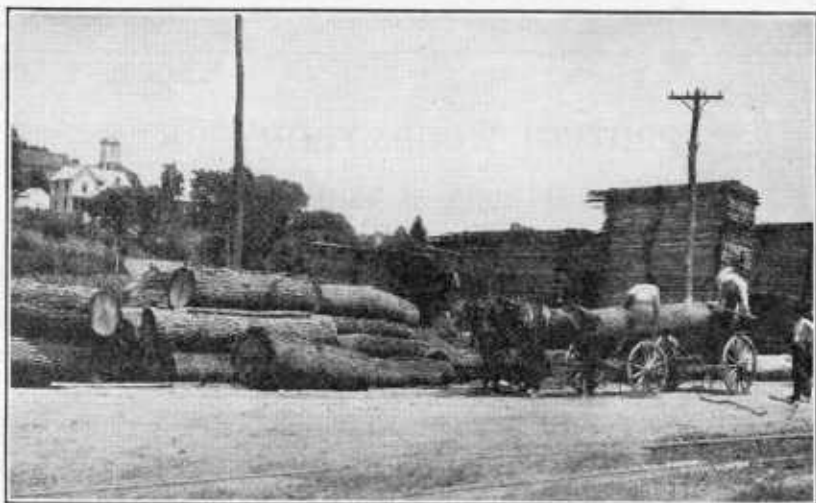
TABLE 1.—Champlain Log Scale.¹

Diameter of log (between bark at small end).	Length of log, in feet.							
	8	9	10	11	12	13	14	15
	Contents of log, in board feet.							
Inches.	11	12	14	15	17	18	19	21
6.....	16	18	20	22	24	26	28	30
7.....	21	24	27	30	32	35	38	40
8.....	28	31	35	38	42	45	49	52
9.....	35	40	44	48	53	57	62	66
10.....	43	49	54	60	65	70	76	81
11.....	52	59	65	72	78	85	92	98
12.....	62	70	78	85	93	101	109	116
13.....	73	82	91	100	109	118	127	136
14.....	84	95	105	116	126	137	147	158
15.....	97	109	121	133	145	157	169	181
16.....	110	123	137	151	165	178	192	206
17.....	124	139	155	170	186	201	217	232
18.....	139	156	173	190	208	225	242	260
19.....	154	173	193	212	231	251	270	289
20.....	171	192	213	235	256	277	299	320
21.....	188	212	235	259	282	306	329	353
22.....	206	232	258	284	309	335	361	387
23.....	225	253	282	310	338	366	394	422
24.....	245	276	306	337	368	398	429	460
25.....								490

TABLE 2.—Doyle Log Scale.²

Diameter of log (between bark at small end).	Length of log, in feet.					
	6	8	10	12	14	16
	Contents of log, in board feet.					
Inches.	1.5	2	2.5	3	3.5	4
6.....	3.4	4.5	5.6	6.8	7.9	9
7.....	6	8	10	12	14	16
8.....	9	12	16	19	22	25
9.....	13	18	22	27	31	36
10.....	18	24	31	37	43	49
11.....	24	32	40	48	56	64
12.....	30	40	51	61	71	81
13.....	37	50	62	75	87	100
14.....	45	60	76	91	106	121
15.....	54	72	90	108	126	144
16.....	63	84	106	127	148	169
17.....	73	98	122	147	171	196
18.....	84	112	141	169	197	225
19.....	96	128	160	192	224	256
20.....	108	144	181	217	253	289
21.....	121	162	202	243	283	324
22.....	135	180	226	271	316	361
23.....	150	200	250	300	350	400
24.....	165	220	276	331	386	441

¹ The Champlain rule shows approximately the amount of lumber cut from logs by close sawing. The full table includes logs up to 60 inches in diameter.
² The Doyle rule was originated at the time of abundant and cheap timber. It gives a much smaller scale for small-sized logs than is actually sawed out according to present custom. The full table runs to and includes logs 40 inches in diameter.



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FIG. 8.—Choice logs bring high prices and are often shipped long distances.

In finding a buyer for his timber the owner should inquire of his neighbors who have sold, or at local sawmills, wood yards, wood-using factories, railroad stations, and telegraph and telephone companies. He should also advertise in the papers and write personal letters furnishing a brief description of the kind, quality, and amount of timber for sale, in order to awaken competition among local and outside buyers. Securing a number of bids for the same piece of timber will tend to develop the best market and increase returns. It is well to have a written agreement as to the manner in which the timber shall be cut, the amount and form of payment.¹

Some of the industries buy their supplies largely or wholly in the log; hence, in many cases it will pay the farmer to look up these special markets for his logs, bolts, poles, ties, etc. Industries buying their supplies more or less generally in the form of round timber are manufacturers of handles, cooperage, veneer, woodenware and novelties, shuttles, bobbins and spools, vehicle stock, athletic goods, and pulpwood. Poles are purchased by electric lighting, power, and telephone companies. Markets for piling will be found by applying to railroads, wharf, bridge, and bulkhead contractors in the larger towns and cities. For prices on ties, consult the nearest local railroad station agent. Cordwood is used by brickmakers, bakeries, limekiln operators, and fuel dealers in towns.

¹ A sample contract and a good many helpful points on measuring and selling farm forest products may be found in Farmers' Bulletin 715, "Measuring and Marketing Farm Timber," and Farmers' Bulletin 1100, "Cooperative Marketing of Woodland Products."

PROTECT WOODS FROM FIRE.

A tree will make a million matches—a match may destroy a million trees.

Take no chances with lighted matches, tobacco, brush or camp fires.

Forest destruction is quick—forest growth slow.

Burned timber pays no wages.

When fire is discovered, put it out if you can. Get help if you need it.

ARE YOU PRACTICING PREVENTION AND FOREST PROTECTION?

HELP PREVENT WOODS FIRES.

BE SURE your match is out before throwing it away.

DON'T throw away burning tobacco.

CHOOSE a safe place and make your camp fire small.

PUT OUT your fire with water and then cover it with earth.

DON'T make large brush heaps. Choose a still day for burning, and plow furrows to protect near-by woods.

BE CAREFUL WITH FIRE.

FIRE PROTECTION.

The forest must be protected. Fire, grazing, careless logging, tree diseases, and insect pests are the principal sources of injury.

Fire kills the little trees and weakens full-grown trees so that they may become diseased or infested with insects. It also destroys the humus cover of leaves and twigs that ordinarily protects the trees against summer drought and heat, conserves water for the springs and streams, and enriches the soil by adding nitrogen. The loss of this natural fertilizer by burning amounts to a very large sum, entirely sufficient to warrant complete fire protection of the country's forests.

Burning over the ground with the aim of improving grazing is an expensive mistake. Although it is possible to secure green grass for stock a week or two earlier in the spring, most of the rich leguminous plants and annual grasses are exterminated, leaving as survivors only the hardy bunch, wiry, and other coarse perennial grasses.

Dead trees and tops cut in logging are a fire menace and should, if possible, be utilized. Sawlogs or firewood can be made out of the dead trees and the unused large tops should be lopped so that they will lie close to the ground and rot quickly.

Some idea of the prevalence of fires in the eastern United States, including the Mississippi Basin, may be formed from the fact that here occur 80 out of every 100 forest fires. For the three years of 1916, 1917, and 1918 the 27,500 fires in this region burned over 13,000,000 acres of forest land and caused a property loss amounting to more than \$19,000,000. While fires were reported from all States, a greater number of fires and larger losses occurred in the southern pine district than in any other important forest region.

Are there any laws about forest fires? Yes. Practically every State has strict laws against the setting of fire and carelessness in the burning of brush. In a number of States the railroads are required to use efficient spark arresters in their locomotives and burn fire lines along their rights of way.

Forest fire protective systems have been established by a number of States. Patrolmen are employed who travel the regions where there is danger of forest fires, watch for fire, and educate the public in the need for care in preventing fire and for getting quickly to any fire that may occur. Owners of woodland should get in touch with the State foresters and fire patrolmen and secure their cooperation and assistance in keeping down fire damage.

GRAZING AND INSECT DAMAGE.

Horses and cattle eat and break down young trees and pack the ground hard. Sheep and goats destroy large numbers of small

trees by eating them. Hogs root up the ground, digging up the young trees and roots and sometimes eating the roots. They also prevent young trees from starting by devouring the nuts and other seeds from which they grow. On the other hand, however, trees bearing small or unpalatable seeds often start well after hogs have rooted up the leaf litter and soil.

Some people fear that good pasture will be wasted by keeping stock out of the woods. This is hardly true, since a fully stocked woodland has little or no grass in it, for the reason that there is insufficient light. (Fig. 9.) Studies in farm management in north-western Pennsylvania show that an open stand of trees, such as occur



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FIG. 9.—Pine grows rapidly and every five years yields a crop by thinning.

in average wooded pastures, reduces the pasturage value of the land as much as 65 to 70 per cent.¹ Grass in the woods is a sign that the stand is in poor condition and the trees too far apart for growing a good quality and large amount of timber. This hardly applies in the southern longleaf pine region, where much good timber occurs in open stands. Grass grown under the shade of trees is much less nutritious than that grown in the open, so its actual food value is small.

Plenty of shade for live stock should be provided in pastures, but pasture land and woodland are most profitable when managed separately, each for the growing of its own individual product.

¹ Agriculture Bulletin 853, "The Organization and Management of Farms in North-western Pennsylvania."

Woodland may be guarded against serious insect damage and disease by removing dead or dying trees and all those showing signs of insect attack or decay. In the South, pine should be cut in the cool part of the year. When it is cut in summer, barkbeetles and wood-borers injure the cut trees, multiply rapidly, and spread to living trees, which they often kill by eating the rich inner bark for food. In cases of insect menace or injury it would be best to get into communication with the Bureau of Entomology, U. S. Department of Agriculture, or the State entomologist.

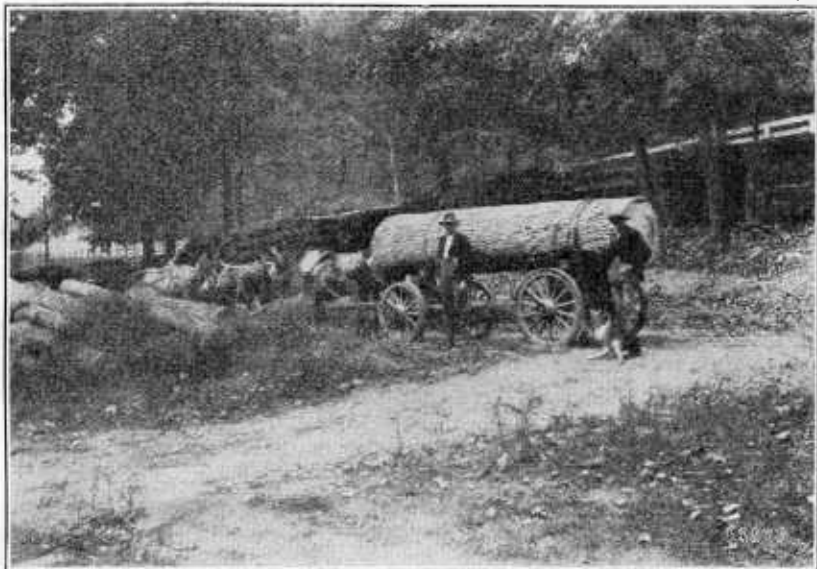


FIG. 10.—Because they split easily, clear white oak butt logs have been worked up into fence posts when several farmers could have jointly shipped a carload at fancy prices.

USING TIMBER AT HOME.

Lack of knowledge of the proper use of timber is one form of farm mismanagement.

It is a mistake to saw up choice logs of white oak, ash, cherry, and yellow poplar for rough uses at home, or to use clear black walnut for gate boards, or split up white-oak butts for fence posts. (Fig. 10.) Many valuable logs go into crossties, when they would bring the owner much more if sold as saw logs. Large numbers of young, rapid-growing trees, producing only one small tie, are cut, which, if left to grow for from three to five years, would more than double the profit.

Cutting is commonly done promiscuously without regard to continuing the future productiveness of the woodland, and large amounts of timber are commonly wasted in high stumps and long tops.

The importance of the home forest as a reserve for "pinch" times can not be overestimated. In the midst of the lumber shortage and high prices during the fall of 1919 and the spring of 1920, for example, communities and individual farms having local supplies of standing timber are reported to have suffered the least from the widespread deterioration of farm buildings and deferment of necessary new construction. The effect has been not only smaller losses of crops and live stock but better farm conditions and more contended farm labor.

Timber that is cut in the late spring and summer months should be handled with special care to avoid injury. This is because freshly cut wood is then more likely to be attacked by insects and fungi than during the cold part of the year. Seasoning also proceeds more rapidly during the warmer season and may cause excessive checking. If rightly handled, posts, poles, and logs may be cut at any season without their durability being affected. In no case should wood be allowed to lie in direct contact with the ground. The opportunity for insect attack and decay can be reduced to a minimum by peeling the timbers and open piling them off the ground in a shaded but dry place. This, however, does not retard checking of the wood.

Logs are sometimes stored under water in the hot season to prevent blue stain, checking, insect attack, and decay. Painting the ends of logs with a yellow ochre or barn paint will very materially retard injury by end checking. Painting peeled timbers with creosote will prevent sap stain and decay.

TREATING FENCE POSTS.

Every farm needs fence posts, but relatively few have sufficient supplies of lasting wood to meet home needs. This is particularly true in the Middle West and South. By means of a simple method of treating timber in open tanks with cold-tar creosote, the post and pole problem can be readily solved. By this process such short-lived woods as soft maple, beech, birch, sweet gum, black gum, young or sap pine, and red oak are made durable for use in the ground for 10 to 20 years, or even longer.

A comparison of the annual costs of maintaining three fences built with posts of untreated sap pine, untreated white or post oak, treated white or post oak, and treated sap pine, respectively, indicates a saving of \$6 to \$24 per mile in favor of the treated pine. The following estimate is believed to be representative of the costs over a considerable part of the region where white oak or post oak and yellow pine occur:

Relative economy of treated and untreated fence posts.¹

	Untreated sap pine.	Untreated white or post oak.	Creosoted sap pine.
Cost of post.....	\$0. 05	\$0. 12	\$0. 07
Cost of treatment.....			. 18
Cost of setting.....	. 15	. 15	. 15
Total cost of post in ground.....	. 20	. 27	. 40
Average life of post in years.....	2	6	15
Average yearly cost.....	\$0. 10	\$0. 04½	\$0. 02½
Average yearly cost of 1 mile of fence (posts 1 rod apart).....	\$32. 00	\$14. 40	\$8. 00

¹ The costs of materials and labor, which were representative in 1919, should be regarded as showing relative rather than absolute values.

Although more expensive at the outset, creosoted posts are generally more economical to use than many kinds of untreated, short-lived woods, because of their much greater lasting qualities. The exceptions would be in remote localities with cheap wood and labor and where it would be expensive to obtain creosote. The large saving in the replacement charges, which ordinarily mount up so high in maintaining a fence, and the use of cheap and inferior kinds of wood in the first place, much more than offset the increased cost of thorough treatment with creosote. (Fig. 11.) Treated posts are a good investment and their use where lasting woods are scarce or expensive is a sign of sound judgment in farm management.

Cutting and seasoning.—It is important that the timber be peeled and thoroughly seasoned before an attempt is made to treat it. Small flakes of inner bark left on the wood prevent proper absorption of the preservative at those places. Peeling is done most easily during the spring months, but is carried on at other seasons of the year. The posts to be treated should be peeled from 3 to 4 months, depending upon the weather, before treatment, and open-piled in a dry situation to effect proper seasoning.

Kinds of posts.—Because they have a uniform absorbing surface of sap wood, round sticks are more satisfactory than split timber for treatment.

It is not profitable to treat lasting woods, such as red cedar, black locust, chestnut, and white oak. Practically all of the soft woods or sap woods may be treated and profitably used as posts.

Small-sized timber.—When treated timber is used it is not necessary to cut the large-sized line posts commonly employed untreated in the past. A post from 2 to 3 inches in top diameter, long enough to allow only a few inches above the top wire, costs less for creosoting and labor in handling, lasts as long as larger-sized timber, and possesses ample strength for ordinary fences. Small-sized trees are

abundant in second-growth timber, often being crowded out by more vigorous neighboring trees. Cutting these for fence posts utilizes



FIG. 11.—The treating of nondurable timber brings many kinds of wood into new forms of utilization. (Photo by courtesy of Iowa State College of Agriculture.)

the forest product that would often otherwise be wasted, improves the remaining stand, and furnishes profitable employment on the farm during slack time.

Kind of treatment.—Application of creosote by brushing over the whole post is only slightly effective in preventing decay, and rot often starts in small cracks which are not reached by the brush, or in checks which soon develop while the post is in use.

Open-tank treatment with a hot bath, followed by a cold bath is recommended for fence posts. The sapwood surrounding the heart-

wood takes treatment readily and is thereby protected against the entrance of decay.

Preservative.—It is important to use a good preservative, and coal-tar creosote has been found to be by far the most satisfactory material. Ordinary gas tar or coal tar has been used more or less, but it is usually too thick even when treated to give a fair degree of penetration.

Treating.—The best treatment is that which results in the deepest penetration into the wood with the least absorption of creosote. The butts of the posts should be placed for one to two hours in creosote heated to a temperature of 180° to 220° F. It is important to treat the wood to a height of a foot above the proposed ground line. In the southern States, the entire post should then be submerged into cold oil, 80° to 100° F., for one to two hours, or for such time as is necessary to get a good penetration. In the North where decay is less rapid, the cold treatment is applied usually to the butts only, the tops being treated by painting or dipping in creosote.

A satisfactory outfit for treating posts successfully consists of an upright cylindrical tank for the hot treatment, and a horizontal rectangular tank for the cold bath.

A saving in cost can be made by two or more farmers joining together in the purchase and use of treating tanks. This method in a number of instances has proved to be a successful form of cooperation.

PLANTING FOREST TREES.

The profitableness of forest planting can not be laid down by any rule, since it is subject to very wide variation. Rapid-growing kinds of trees of good, standard value can be grown profitably, however, on cheap lands located relatively near good markets. For example, as shown by actual demonstration on page 29, white pine yields very good returns in New England, and the same may be said of the yellow pines in various parts of the South. By good authorities it is held that white pine is the most profitable crop possible on large areas of New England. In the Northeastern States, Wisconsin, and Minnesota, the white pine blister rust is present, and planters of white pine should protect it from this disease by destroying all wild and cultivated currants and gooseberries within three hundred yards of the plantation. These bushes are the alternate hosts of the blister rust and if permitted to remain near native or planted white pines in regions where the blister rust is prevalent, the trees become diseased and gradually die. Usually the cost of uprooting wild currant and gooseberry bushes is small.¹

In rich agricultural belts the planting of forest trees on a large scale for direct money returns would undoubtedly prove to be

¹ For further information relative to protection from blister rust consult your State forester or the Bureau of Plant Industry, United States Department of Agriculture.

DENUDED HILLS**MEAN—****Floods.****Clogging of streams, lakes, and reservoirs.****Waste of soil.****Destruction of prosperous farms and other industries.****DEVASTATION.**

a losing investment. Here, however, considerable forest planting goes on, but on relatively small, isolated tracts on farms and for special purposes, depending upon local conditions. Forest trees are planted chiefly to check soil erosion on slopes; to afford a wind-break as shelter for growing crops, live stock, and man; and to utilize to the best advantage rough, stony, or poor soils and inaccessible and wet lands.

In western Tennessee, where the soil is a very deep, rich, clay loam, known locally as "brown loam," forest planting is being extensively pushed by the State as a means of reclaiming and making profitable badly eroding lands and at the same time checking at the source of the small streams the silting which results in expensive dredging operations on the Mississippi River and its navigable tributaries. Similar conditions prevail over large areas in other States of the Mississippi Basin and in the Piedmont section and lower slopes of the Appalachians.

On the farms of the eastern United States many thousands of acres of slopes have been cleared and become waste from which the forest should never have been removed. Careful cutting by the selection method would have resulted in keeping the land continuously productive. This mistake is still going on in some rural sections where foresight and study have not yet been generally applied to farm management.

FORESTED HILLS**Protect the soil.****Store up water.****Feed springs and streams.****Support prosperous farms and other industries.****PROTECTION.**

PROFIT IN GROWING TIMBER. AN EXAMPLE.



This white pine, which was planted on an abandoned sidehill pasture of about 3 acres in New Hampshire 44 years ago, now contains about 90,000 board feet of lumber. The total outlay at the time, counting the value of the land and labor of planting, was \$35. The timber to-day is worth on the stump something over \$1,500.

The farmer had this strip of practically worthless sidehill, and with some spare time on hand dug up 1,400 seedling pines growing in a thicket and set them out. About 20 years later the farmer died and among his assets was this small tract of young pine for which, much to her surprise, the widow was offered \$300. The second owner retained it for about 15 years and then, wishing some money, sold it. Soon afterwards it came into the hands of the present owners, a lumber company, for something over \$1,000.

Assuming a land value of \$5 per acre, and a charge for taxes and oversight for the period averaging \$2 per acre per year, the operation has yielded a return of 5 per cent on the total investment in land, labor, and annual outlay, and in addition a neat sum equivalent to a yearly net profit from the start of over \$5 per acre.

Forest-tree planting is practicable as a means of improving the quality of the woodland and increasing the quantity and value of its product. Through carelessness, cutting, fire, and other agencies many woodlands have fallen far below their maximum capacity of production. By the application of a little intelligent guidance in making proper improvement cuttings and by affording protection from grazing animals and fire it is often possible within the period of a few years to bring about a marked change for the better in the composition and quality of the woodland. This method often succeeds better than planting trees. This is illustrated by the experience of woodland owners. A progressive farmer in Summit County, Ohio, wishing to handle his woodlands rightly, excluded all live stock by fencing and at the same time planted catalpa in the larger openings in his woods. In 10 years the forest floor, instead of being bare and packed hard, consisted of a deep layer of spongy organic matter, affording protection to the roots of the trees. A complete understory of young yellow or tulip poplars, hard maple, beech, elm, white oak, hickory, and ash had sprung up. The volunteer poplars, it should be carefully noted, had grown to from 6 to 12 feet in height and completely overtopped and suppressed the planted catalpa. Since the poplars were the more valuable of the two species because of their rapid rate of growth and the useful quality of the lumber, nature had beaten the owner at his own game. By making proper thinnings, then, in 5 years the woodland was brought to the very satisfactory condition of having a good stand of valuable species of trees filling all the openings and coming on to take the place of the mature trees as cut.

In choosing species for planting it is always best to consider first the most desirable kinds of native trees, since they are already acclimated to the local conditions and are least subject to failure. In general, the various conifers, including the pines, are to be recommended for planting in most sections of the country because they are quick growing and yield softwood, which is in more demand than the hardwoods. Cottonwood, which holds the record for the fastest production of wood, is a good tree for relatively moist situations of good soil. Black locust takes root quickly on dry slopes and possesses to a marked degree the ability to hold the soil against agents of erosion. (Fig. 12.) It is somewhat limited in its range of successful growth by a locust boring beetle, which, however, can be controlled to a great extent by means of proper spacing and handling of plantations.¹ Black walnut is probably one of the best kinds of trees for the farm, owing to the high quality and value of its wood

¹ Refer to U. S. Department of Agriculture Bulletin 787, "Protection from the Locust Borer."

and its production of edible nuts. The more desirable trees for the farm to be favored in planting over a large region of the Eastern States include also the faster-growing red oaks, white oak, ash, hickory, and yellow poplar.¹

The planting of forest trees for shade, nut production, and ornamental purposes, as the original timber becomes scarcer, has an increasing place of importance on our farms and likewise in the towns and cities.

Information regarding the kinds of trees, ways of obtaining seed or seedlings, methods of sowing and planting, and the care of trees can be had upon application to the various State foresters or the Forest Service, U. S. Department of Agriculture. Some of the

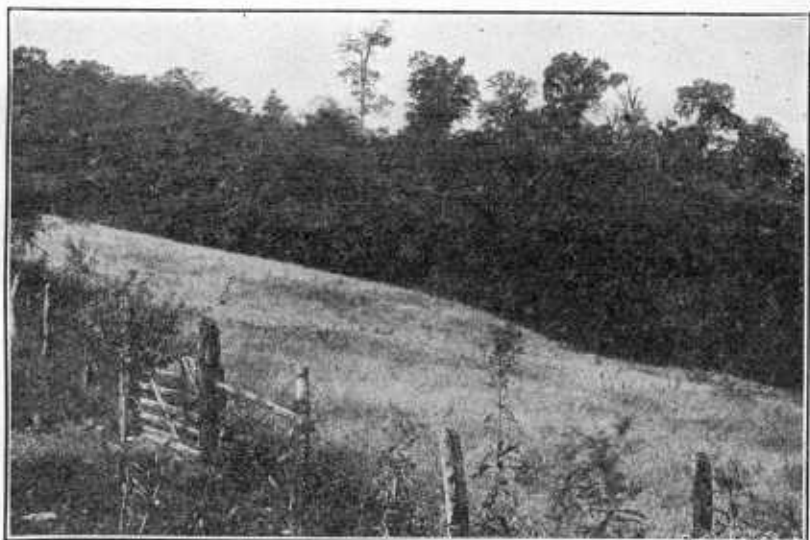


FIG. 12.—Black locust planted on waste land, supplying the farm with fence posts and enriching the soil.

State foresters, in addition to furnishing information, supply tree seedlings of the most desirable species at cost prices.

Next to the improvement of existing woodlands by proper handling and good methods of marketing the products, no branch of farm forestry is of greater importance than forest planting.

ADDITIONAL INFORMATION.

(1) Additional information on forestry may be secured by writing to the Forester, Forest Service, Washington, D. C. A list of available forestry publications can be obtained, including those bear-

¹ Much practical information on what to plant and how to plant forest trees is found in Farmers' Bulletin 1085, "Growing and Planting Hardwood Seedlings on the Farm."

ing directly on the subject of forestry for the farm. Some of the more important are:

- Basket Willow Culture (Farmers' Bulletin 622).
- Care and Improvement of Farm Woods (Farmers' Bulletin 711).
- Measuring and Marketing Farm Timber (Farmers' Bulletin 715).
- Cooperative Marketing of Woodland Products (Farmers' Bulletin 1100).
- Preservative Treatment of Farm Timber (Farmers' Bulletin 744).
- Waste Land and Wasted Land on Farms (Farmers' Bulletin 745).
- The Windbreaks as a Farm Asset (Farmers' Bulletin 788).
- Advice to Forest Planters in the Plains Region (Farmers' Bulletin 888).
- The White Pine Blister Rust (Farmers' Bulletin 742).
- Machinery for Cutting Firewood (Farmers' Bulletin 1023).
- Making Woodlands Profitable in the Southern States (Farmers' Bulletin 1071).
- Growing and Planting Hardwood Seedlings on the Farm (Farmers' Bulletin 1085).
- Beautifying the Farmstead (Farmers' Bulletin 1087).
- Street Trees (Agricultural Department Bulletin 816).
- The Status and Value of Farm Woodlots in the Eastern United States (Agricultural Department Bulletin 481).
- Use of Wood for Fuel (Agricultural Department Bulletin 743).
- Small Sawmills (Agricultural Department Bulletin 718).
- Protection from the Locust Borer (Agricultural Department Bulletin 787).
- Protection of Forests from Fire (Forestry Bulletin 82); price, 15 cents.

(2) Circulars or bulletins on various phases of home forestry have been published by most of the State foresters. No attempt is made here to list these publications, but applications for information on forestry should be addressed to the various extension specialists in forestry connected with the State agricultural colleges, to the county agents, or to the State forestry departments, as follows:

State.	Official.	Address.
Alabama.....	State commissioner of forestry.....	Montgomery.
California.....	State forester.....	Sacramento.
Colorado.....	State forester.....	Fort Collins.
Connecticut.....	State forester.....	New Haven.
Idaho.....	State commissioner of forestry.....	Boise.
Indiana.....	Secretary, State board of forestry.....	Indianapolis.
Iowa.....	State forestry commissioner.....	Des Moines.
Kansas.....	State forester.....	Manhattan.
Kentucky.....	Commissioner of geology and forestry.....	Frankfort.
Louisiana.....	Superintendent of forestry.....	New Orleans.
Maine.....	Forest commissioner.....	Augusta.
Maryland.....	State forester.....	Baltimore.
Massachusetts.....	State forester.....	Boston.
Michigan.....	State forester.....	Roscomon.
Minnesota.....	State forester.....	St. Paul.
Montana.....	State forester.....	Helena.
New Hampshire.....	State forester.....	Concord.
New Jersey.....	State forester.....	Trenton.
New York.....	Superintendent of forests.....	Albany.
North Carolina.....	State forester.....	Chapel Hill.
North Dakota.....	State forester.....	Bottineau.
Ohio.....	State forester.....	Wooster.
Oregon.....	State forester.....	Salem.
Pennsylvania.....	Commissioner of forestry.....	Harrisburg.
Rhode Island.....	Commissioner of forestry.....	Chepachet.
South Dakota.....	Forest supervisor.....	Custer.
Tennessee.....	Forester of State geological survey.....	Nashville.
Texas.....	State forester.....	College Station.
Vermont.....	Chief forester.....	Montpelier.
Virginia.....	State forester.....	University.
Washington.....	State forester.....	Olympia.
West Virginia.....	Forest warden.....	Phillippi.
Wisconsin.....	Conservation commissioner.....	Madison.

(3) Sets of about 50 colored lantern slides, each, accompanied by a syllabus, or lecture, will be loaned to schools and other educational agencies by the Forest Service for short periods on condition that borrowers agree to pay transportation charges, to be responsible for slides lost or broken, and to forward the slides promptly and in good condition upon request. Application should be made as far in advance of the need as possible, since the sets are usually engaged for a considerable time in advance. The subjects upon which sets are available are:

Forestry in Agriculture.
Farm Forestry in the South.
Tree Windbreaks.
Street Trees.
Farm Woodlands.
Nature Study and Forestry.
Botany and Forestry.

Manual Training and Forestry.
Geography and Forestry.
Life of a Tree.
Conservation of the Forest.
Forestry in the United States.
The Work of the Forest Service.
Recreation on National Forests.

Application should be made to the Forester, Forest Service, Washington, D. C., for the loan of any of the above sets of lantern slides.



F-28849

FIG. 13.—Forest trees needed to check soil erosion and make land bring an income.

WOODLANDS on farms in the eastern half of the United States would form a strip 105 miles in width reaching from New York to San Francisco.

Farmers own as much forest land as do all the lumbermen and other private holders together.

Farms contain more than one-half the entire hardwood forest area of the United States.

Woods occupy a larger part of the farms of this country than does any other crop; in fact as much as all the cereal crops combined.

The haphazard cutting of trees with no plan or thought for the future invariably results in the deterioration of the woods, both in quality and value. Often the rapid-growing, straight trees are cut because they can easily be worked up, and yet these are the very ones that should be left to develop into high-grade timber.

Using good pasture land to support scrub stock and devoting woodland to the growing of inferior trees are both examples of mismanagement on the farm.

Many woodlots on farms consist of park-like stands of defective trees having little commercial value. The forest should be so dense that little grass can grow. If stock need additional shade some woodland may be included in the pasture. The attempt to combine stock grazing with timber growing in farm woods is neither good grazing practice nor profitable forestry.

A forest without young growth is like a community of old people; it will die out.

Timber is a national necessity; the supply of it is being rapidly depleted. By growing more timber, the farmer increases his own income and benefits the public.

On the poorer lands of many farms in the United States white pine, ash, oak, hickory, poplar, black walnut, cottonwood, black locust, shortleaf pine, or slash pine is the best-paying crop.

On remote farms, where buyers formerly would make no offer on less than a carload of timber, good roads and the motor truck have made it possible for the farmer to sell individual trees at fair prices.

On account of big increases in prices the total value of the timber product for farm woodlands in 1919 is estimated to have risen to about double that of 1910, or to about \$400,000,000.

FORESTRY INCREASES FARM INCOME BY

1. Making waste lands yield a profit by growing timber on
 - Poor soils Wet lands
 - Steep slopes Unused corners
 - Rocky lands Eroded lands.
2. Furnishing paying employment for men and teams during the winter.
3. Utilizing timber better on the farm and avoiding waste by
 - Cutting low stumps and small tops,
 - Using substitute woods in construction,
 - Treating nonlasting woods.
4. Increasing crop yields by planting forest tree windbreaks.
5. Growing more and better timber on the farm through
 - Protecting the woods from fire and overgrazing,
 - Selecting for cutting the mature, defective, overcrowded, and inferior kinds of trees, and leaving the straight, thrifty, and better kinds,
 - Planting to fill openings in woods.
6. Marketing the higher grades of wood products direct to consumers at fair prices as
 - Saw logs Posts
 - Poles Pulpwood
 - Piling Firewood
 - Cooperage bolts Spoke blocks
 - Handle bolts Tannin bark.

MAKE YOUR WOODLAND PERMANENTLY
PROFITABLE.



Good Timber Wasted
by Woods Fires